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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,175

12/20/2004

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16869S-137100US

5251

20350 7590 07/17/2008  
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EXAMINER

HARRISON, MONICA D

ART UNIT

PAPER NUMBER

2813

MAIL DATE

DELIVERY MODE

07/17/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/519,175	<b>Applicant(s)</b> NAGANO ET AL.	
	<b>Examiner</b> Monica D. Harrison	<b>Art Unit</b> 2813	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 June 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 18 and 21-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18 and 21-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                      |                                                                   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____                                                          | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

1. Applicant's request for continued examination (RCE) filed 6/20/08 has been entered. Examiner acknowledges claims 1-17, 19, 20 and 28-30 are cancelled.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24, 18, 21 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uemura (6,331,450 B1) in view of Sasaki et al (JP 2002-9111A) further in view of Yamaguchi et al (6,610,934).

2. Regarding claim 24, Uemura discloses a method of making a semiconductor device comprising: sealing the semiconductor device in a package by surrounding it with thermosetting resin (Figure 3D, reference 230) and thermally curing the resin at a first temperature (column 4, lines 59-67; *curing temperature is higher than the baking temperature*); baking the thermosetting resin at a second temperature not higher than the first temperature (column 6, lines 61-67 thru column 7, lines 1-3); and (d) inspecting the semiconductor device (column 6, lines 13-24).

However, Uemura does not disclose further baking the thermosetting resin at a third temperature higher than the first temperature, wherein the third temperature is between 220C and 260C.

Sasaki et al discloses further baking the thermosetting resin at a third temperature higher than the first temperature, wherein the third temperature is between 220C and 260C (pg.4, paragraph 0012 (*2<sup>nd</sup> and 3<sup>rd</sup> temperature*); pg.1, paragraph 0003 (*1<sup>st</sup> temperature; preheat*)).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Uemura with the teachings of Sasaki et al, for the purpose of applying a third temperature range of 220C to 260C to harden and cure the binder layer and reduce the residual stress and improve connecting strength in a bonding interface in a semiconductor device.

Uemura and Sasaki et al disclose the above claimed subject matter except the semiconductor device to be soldered with an SnAgCu type solder to a substrate.

Yamaguchi et al discloses the semiconductor device to be soldered with an SnAgCu type solder to a substrate (column 13, lines 52-61).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Uemura and Sasaki et al, with the teachings of Yamaguchi et al, for the purpose of using a lead free solder in order to form a connection within a substrate and device in a semiconductor module.

3. Regarding claim 18, Uemura discloses wherein step (b) advances curing of the thermosetting resin (column 6, lines 61-67 thru column 7, lines 1-16).

4. Regarding claim 21, Uemura discloses wherein the semiconductor device comprises an integrated circuit (Figure 2F, reference 100).

5. Regarding claim 25, Sasaki et al discloses wherein a conductive lead is adhesively affixed to a main surface of the semiconductor device (Drawing 1, Figure 14).

6. Regarding claim 26, Sasaki et al discloses wherein the conductive lead is adhesively affixed to a peripheral portion of the main surface of the semiconductor device (Drawing 1, reference 14).

7. Regarding claim 27, Sasaki et al discloses wherein an electrode of the semiconductor device is electrically connected to the conductive lead (Drawing 1, reference 20).

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uemura (6,331,450 B 1), Sasaki et al. (JP 2002-9111A) and Yamaguchi et al (6,610,934) further in view of Kajiwara et al (6,774,466 B1).

8. Uemura, Sasaki et al and Yamaguchi et al disclose all above claimed subject matter however they do not discloses sealing the thermosetting resin by use of a transfer molding process (claim 22) or the potting process (claim 23).

Kajiwara et al discloses sealing the thermosetting resin by use of a transfer molding process (column 15, lines 53-60) and the potting process (column 29, lines 55-59).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Uemura, Sasaki et al and Yamaguchi et al, with the teachings of Kajiwara et al, for the purpose of using the potting process and the transfer molding process for sealing a thermosetting resin because each of these methods may be used to seal the resin around a circuit.

### ***Response to Arguments***

9. Applicant's arguments with respect to claim 24 have been considered but are moot in view of the new ground(s) of rejection. Sasaki et al (JP 2002-9111A) discloses all

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temperature ranges used for baking and curing the resin (pg.4, paragraph 0012 (*2<sup>nd</sup> and 3<sup>rd</sup> temperature*); pg.1, paragraph 0003 (*1<sup>st</sup> temperature; preheat*)).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is (571)272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Monica D. Harrison/  
Examiner, Art Unit 2813

/Tuan N. Quach/  
Primary Examiner, Art Unit 2826

mdh  
July 15, 2008